

**Amendments to the Claims:**

This listing of claims will replace all prior versions, and listings, of claims in the application:

**Listing of Claims:**

Claims 1-51 (Cancelled).

52. (New) An apparatus for selecting a subpopulation of spermatozoa, comprising:

(a) a culture chamber having at least one first compartment, at least one second compartment and a passage enabling spermatozoa access between the at least one first compartment and the at least one second compartment; and,

(b) means for generating a discrete or continuous temperature gradient between the at least one first compartment and the at least one second compartment such that the temperature in said at least one first compartment is lower than the temperature in said at least one second compartment.

53. (New) The apparatus according to claim 52, wherein the culture chamber is adapted for containing culture

medium suitable for maintaining the motility of mammalian spermatozoa.

54. (New) The apparatus according to claim 52, the passage further comprising a matrix between the at least one first compartment and the at least one second compartment.

55. (New) The apparatus according to claim 54, wherein the matrix is selectively permeable to spermatozoa.

56. (New) The apparatus according to claim 55, wherein the matrix comprises a material selected from the group consisting of: a biocompatible gel, fibrin substrate, silicon, carbon blocks or fibers, polysaccharides and collagen.

57. (New) The apparatus according to claim 52, wherein the culture chamber comprises a biocompatible material selected from the group consisting of: glass, polycarbonate, polyethylene, polyurethane, ethylene-vinylacetate copolymer and polyolefins.

58. (New) The apparatus according to claim 52, wherein the culture chamber is sterile or aseptic.

59. (New) The apparatus according to claim 52, further comprising means for monitoring sperm motility.

60. (New) The apparatus according to claim 52, wherein the culture chamber is disposable.

61. (New) The apparatus according to claim 52, wherein the temperatures within the temperature gradient are suitable for maintaining sperm viability and the difference between the highest and the lowest temperatures of the temperature gradient is between 0.05°C to 20°C.

62. (New) A system for generating a subpopulation of spermatozoa enriched for capacitated spermatozoa, comprising the apparatus of claim 52 and further comprising means for retrieving spermatozoa from said at least one second compartment.

63. (New) The system according to claim 62, further adapted for employing semen washing.

64. (New) A method for generating a subpopulation of spermatozoa enriched with capacitated spermatozoa, comprising:

(a) providing a population of spermatozoa in at least one first site;

(b) exposing the population of (a) to a discrete or continuous temperature gradient induced between the at least one first site and at least one second site, wherein the

temperature at the at least one first site is lower than the temperature at the at least one second site;

(c) obtaining a subpopulation of spermatozoa enriched with capacitated spermatozoa from the at least one second site; and, optionally,

(d) repeating step (b) at least once, with the population obtained in (c).

65. (New) The method according to claim 64, wherein step (b) further comprises monitoring sperm motility from the at least one first site to the at least one second site.

66. (New) The method according to claim 64, wherein the population of spermatozoa comprises non-human mammalian spermatozoa.

67. (New) The method according to claim 64, wherein the population of spermatozoa comprises human spermatozoa.

68. (New) The method according to claim 64, wherein the temperatures within the temperature gradient are suitable for maintaining sperm viability and the difference between the highest and the lowest temperatures of the temperature gradient is no between 0.05°C to 20°C.

69. (New) The method according to claim 64, further comprising retrieving a population of spermatozoa after step (b) from the at least one second site.

70. (New) The method according to claim 69, wherein the retrieved spermatozoa is utilized for a fertility treatment.

71. (New) The method according to claim 70, wherein the fertility treatment is selected from the group consisting of: artificial insemination, intrauterine insemination (IUI), intracytoplasmic sperm injection (ICSI), in vitro fertilization (IVF), micromanipulation IVF and intra-vaginal fertilization.

72. (New) The method according to claim 64, further comprising semen washing prior to step (a).

73. (New) An assay for evaluating sperm quality in a population of spermatozoa, comprising:

- (a) providing a population of spermatozoa in a first site;
- (b) exposing the population of (a) to a discrete or continuous temperature gradient induced between the first site and at least one second site, such that the temperature at the

at least one second site is higher than at said first site;  
and,

(c) evaluating the percentage of spermatozoa within the population accumulated at the second site of (b) in comparison to a standard sperm population, wherein the percentage of spermatozoa migrating along the temperature gradient between said first site and the at least one second site is a measure of sperm quality.

74. (New) The assay according to claim 73, wherein the population of spermatozoa comprises mammalian spermatozoa.

75. (New) The assay according to claim 74, wherein the population of spermatozoa comprises human spermatozoa.

76. (New) The assay according to claim 73, wherein the temperatures within the temperature gradient are suitable for maintaining sperm viability and the difference between the highest and the lowest temperatures of the temperature gradient is between 0.05°C to 20°C.